***Profitability Index***

Profitability index is calculated as:

$$PI=\frac{NPV(future cash flows excluding the initial investment)}{Initial investment at time zero}$$

Projects are accepted if their profitability index is more than one. The bigger the profitability index the better.

The profitability index is simple to understand, but since it's a proportional measure, not a dollar value measure, it suffers from the same scale effect problem as the internal rate of return (IRR) method.

***Calculation Example: Profitability Index***

**Question:** A mining firm's potential new gold mine has the following after-tax cash flows:

* $9m outflow to buy extra machinery needed to excavate the mine which will be delivered and paid for immediately (t=0).
* $6m inflow in one year (t=1) from gold sales.
* $5m inflow in two years (t=2) from gold sales.

The discount rate is 10% pa given as an effective annual rate.

What is the profitability index?

**Answer:** Remember that an investment is a cash outflow, just the same as a cost. So a positive investment is a negative cash flow:

$$Initial investment=-\left(C\_{0}\right)=-\left(-9m\right)=\$9m$$

$$NPV\left(future cash flows excluding the initial investment\right)$$

$$ =\frac{C\_{1}}{\left(1+r\right)^{1}}+\frac{C\_{2}}{\left(1+r\right)^{2}}$$

$$ =\frac{6m}{\left(1+0.1\right)^{1}}+\frac{5m}{\left(1+0.1\right)^{2}}$$

$$ =\$9.58677686m$$

$$PI=\frac{NPV(future cash flows excluding the initial investment)}{Initial investment at time zero}$$

$$ =\frac{\$9.58677686m}{\$9m}=1.065197429$$

Since the profitability index is more than one, the project should be accepted.

***Questions: Profitability index***

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